LAND AND CHEMICALS DIVISION
QUALITY ASSURANCE PROJECT PLAN
For Field Sampling Events

Techalloy Company Inc,
6509 Olson Road
Union, IL 60180
EPA ID # ILD 005 178 975

10/02/08

A1. Approvals

PREPARED BY:

Bhooma Sundar B. Sundar 10/2/08
Land and Chemicals Division, U.S. EPA, Region 5

APPROVED BY: Allen A Deluca 10-2-08
Assigned QA Contact
Land and Chemicals Division, U.S. EPA Region 5

APPROVED BY: Gregg Hanson 10-2-08
Section Chief Responsible for Sampling Event
Land and Chemicals Division, U.S. EPA Region 5

APPROVED BY: Jose D. Cisneros 10/03/08
Branch Chief Responsible for Sampling Event
Land and Chemicals Division, U.S. EPA, Region 5

Prologue

A QAPP is designed to focus primarily on :

1) the Data Quality Objectives for the event, (the end result of what the data will be used for),
2) the boundaries of the sampling event (the population that the samples taken herein represent)
3) the acceptance or rejection of the problem posed in the event (the hypothesis)

The QAPP also outlines the analytical methods and QA/QC procedures that are used to analyze the samples and manage the data. The QAPP should include the organization and responsibilities of project laboratory and data assessment personnel; QA objectives; sample receipt, handling, custody, and holding time requirements; analytical procedures, equipment preventive maintenance, calibration, internal quality control procedures, and performance/system audits; data reduction, review, and reporting; and data assessment, data usability, and DQO reconciliation. Additional information may be obtained from EPA QA/R-5, EPA QA/G-5, and other references.

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LIST OF ACRONYMS	
CERCLA	Comprehensive Environmental Response, Compensation, and Liability Act
CRL	Central Regional Laboratory, U.S. EPA Region 5
DQO	Data Quality Objective
FSP	Field Sampling Plan
QA	Quality Assurance
QAPP	Quality Assurance Project Plan
QMP	Quality Management Plan
QC	quality control
RCRA	Resource Conservation and Recovery Act
RPD	relative percent difference
SA	amount of spike or surrogate added
SAP	Sampling and Analysis Plan
SOP	Standard Operating Procedure
SSR	spiked or surrogate sample result
SR	unspiked sample result
U.S. EPA	U.S. Environmental Protection Agency

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A3. DISTRIBUTION LIST

The management, quality assurance, laboratory and field responsibilities are as follows for the United States Environmental Protection Agency (U.S. EPA) sampling event:

U.S. EPA LCD Project Manager – Bhooma Sundar
U.S. EPA LCD Project Assistant – Robert Kay
U.S. EPA LCD QA Contact – Allen Debus
U.S. EPA LCD/CRL Coordinator/REPA COR – (Currently) Brian P. Freeman
U.S. EPA CRL QA Coordinator – (Currently) Marilyn Jupp

A4. PROJECT/TASK ORGANIZATION

A4.1 EPA Project Management

A4.1.1 EPA Project Manager

The EPA Project Manager is Bhooma Sundar, and is responsible for all project activities, and will coordinate field activities.

A4.1.2 EPA Project Assistant

The EPA Project Assistant is Robert Kay (USGS), and is responsible for assisting the EPA Project Manager in all project activities, and will assist in coordinating field activities.

A4.2 Quality Assurance Responsibilities

A4.2.1 EPA Quality Assurance Coordinator

The EPA Quality Assurance Contact is Allen Debus, and is responsible for review of the QAPP.

A4.2.2 EPA CRL Analytical and QA Responsibilities

The *Central Regional Laboratory (CRL)* be responsible for conducting analyses, ensuring that the CRL quality assurance program is implemented, and preparing a report of CRL analyses and quality assurance for the Project Manager. The CRL QA coordinator will ensure that the appropriate standard operating procedures (SOPs) are followed, and that a complete data package is delivered to the EPA Project Manager in the agreed turn around time with CRL.

A4.2.3 U.S. EPA Project Manager Responsibilities

The **U.S. EPA Project Manager** is ultimately responsible for all activities at the site, and coordinating with CRL to complete all proper analyses.

In addition, he or she is responsible for the following:

- preparation of the sampling plan based on site knowledge
- performing and oversight of sample collection activities
- ensuring that the sampling plan and QAPP are followed by the field team

A4.2.4 USGS Field Team Responsibilities

The USGS is responsible for the following:

- sample collection
- photo documentation of the sampling event
- completely recording the details of the sampling event in a log book
- ensuring the QAPP and sampling/safety plans are implemented
- delivering the environmental samples from the field to CRL
- preparing a report of field activities and field quality assurance
- ensuring that chain-of-custody procedures are followed from time of sample collection to arrival of the sample at the laboratory

A4.3 Laboratory Responsibilities (EPA CRL)

CRL is responsible for analysis using 8260B equivalent method to determine the concentration of Volatile Organic Compounds (VOC) in the water sample. The samples will not be analyzed for mercury content.

A complete data package for each analysis shall be composed, and adherence to all CRL analytical methods and procedures shall be required.

A4.4 Field Responsibilities

The U.S. EPA Field Team will be responsible for the sample collection and preparation of the samples, initiating and maintaining chain-of-custody, and delivering all samples to CRL.

A5. PROBLEM DEFINITION/BACKGROUND

A5.1 Site History

Techalloy is located in Section 4, T43N, R6E of McHenry County, IL (Figure 1) at 6509 Olson Rd., just east of the Village of Union corporate limits. The property is the site of an operational metal manufacturing plant. The Techalloy plant was built in 1959 (Buildings 1 and 2 originally) and stainless steel processing operations began in 1960. At the time, the process included cleaning finished wire with trichloroethene with rags, by hand. As the business grew, by the mid 1960s and 1970s vapor degreasing and dip tanks were used for cleaning larger amounts of wire. In the 1970s and early 1980s, 1,1,1-trichloroethane was used for cleaning and was deemed to be safer for the employees. Trichloroethene was used at the site until the early 1980s. In 1990, the Techalloy Union Plant was in the process of being sold. It was and is standard practice to conduct a Phase I

Environmental Site Assessment (ESA) to determine if there were any unknown environmental liabilities that could impact the future owner. The Phase I ESA determined that there was the potential for environmental impact from site activities. As a result, a Phase II ESA was conducted which included the collection and analysis of environmental samples. The samples confirmed that groundwater contained VOCs. This finding led to an Order on Consent with the U.S.EPA resulting in Techalloy conducting a RCRA Remedial Facility Investigation (RFI) and a Corrective Measures Study (CMS) to delineate the extent and impact from the VOCs in groundwater.

The selected corrective measures included the construction and operation of a groundwater extraction and treatment facility to intercept the VOC plume, treatment of the groundwater by air stripping and discharging the treated water to the South Branch of the Kishwaukee River. The system was installed in 1997 and enlarged in 1998 with the addition of a second extraction well and a second stripping system. It has been treating groundwater since that time. In 2001, an air sparging and soil vapor extraction facility was constructed to remove VOCs from soil in the source (plant) area.

In 2006, two sod farm wells were installed offsite and down gradient of the groundwater plume. Due to the high pumping capacity of these wells, the plume has expanded and chlorinated solvents have recently been detected at concentrations above drinking water standards in the sentinel wells. Following this observation, Techalloy sampled the majority of the residential and commercial wells downgradient of the plume.

A5.2 Sampling Locations

The following table provides the actual sampling locations

Owner of Residential Well	Depth of Well	Screened Interval	Address
Non-responsive	Deep well- 70 Feet	40 to 70 Feet	Non-responsive
	Deep well - 85	30 to 80 Feet	
	Shallow well - 25	Point	
	Shallow well	Point	
	Shallow well	Point	
	Shallow Well		
	Intermediate well 50 feet	Point	
	Shallow well – 30 feet	Point	
	Deep well – 250 feet Flag Pole -30	Cracked Lime & Shallow	
	Well in "95" - 67" Bottled water due to NO		
	Intermediate Well 30" Bottled water due to NO	Point	
	Bottled water due to NO	Point	
	Deep-67" 5" well used for irrigation. Bottled Water		
	Shallow Well 30" Drinking Tap Water	Point	

Shallow well -10 feet to 30 feet
Intermediate well – 30 feet to 60 feet
Deep well – 60 feet to 90 feet

A5.3 Project Purpose

The Techalloy facility collects residential samples semi-annually. The purpose of this sampling event is to check the validity of the conceptual groundwater model which concludes that the down gradient contaminant plume is not impacting the commercial and residential wells and also to verify Techalloy's sampling results. This sampling event will check if the detected volatile organic constituents are below the Maximum Contaminant Limit (MCL). The following table provides chemicals of concern and the corresponding MCL

Chemical	Method	Units	MCL
Vinyl Chloride	8260B	µg/l	2
Chloroethane	8260B	µg/l	---
1,1 - Dichloroethane	8260B	µg/l	7
Methylene Chloride	8260B	µg/l	---
Total	8260B	µg/l	170

1,2-dichloroethene			
1,1- dichloroethane	8260B	µg/l	---
1,1,1-trichloroethane	8260B	µg/l	200
1,2-dichloroethane	8260B	µg/l	5
Chemical	**Method**	**Units**	**MCL**
Trichoroethene	8260B	µg/l	5
Toluene	8260B	µg/l	1000
1,1,2- Trichloroethane	8260B	µg/l	5
Tetrachloroethene	8260B	µg/l	5
Total xylenes (m,o&p)	8260B	µg/l	10,000

A6. PROJECT/TASK DESCRIPTION

A6.1 Existing Information
Refer Section A.5.1

A6.2 Task to be Performed
As described in the narrative and table of section A.5.3

A7. QUALITY OBJECTIVES AND CRITERIA

Project Data Quality Objectives (DQOs) provide criteria against which project performance can be evaluated to determine whether overall project QA objectives are met.

Problem definition.
See Section A5.3

Decision to be made.
Concentrations of an analyte greater than MCL reveals a problem.

Inputs to the Decision.
Inputs include the following: Analytical method reporting limits lesser than MCL per table in section A5.3

Study Boundaries.

Decision Rule
Concentrations of an analyte greater than MCL reveals a problem.

Limits on Decision Errors. The decision rules will be applied using valid data derived from the samples. Samples will be selected to be representative of existing conditions. Data quality requirements specific to the method for precision and accuracy will be used to determine the validity or usability of the data. The method precision and accuracy requirements are defined in the individual laboratory procedures and the laboratory QAPP.

Optimize the Design. The locations of possible sources, technical characteristics of the contaminants, and the media in which they are present have been used to determine a cost-effective design for the sample collection. This study will be performed to minimize the number and type of samples collected while supplying sufficient data upon which to apply the decision rules.

A7.1 Project Schedule/Time Table

The time table for this project is as follows:

Table 1. Estimated Project Schedule

Activity	Date
QAPP/Sampling and Safety Plan Approved	DATE
Field Sampling	October 20 or 21, 2008
Sample Analysis	Within **7 days** after sampling completion.
Data Verification	Within **15 days** after analysis.
Draft Report	Within **10 days** after data verification.
Final Report	Within **7 days** of draft report.

A8. SPECIAL TRAINING/CERTIFICATION

The U.S. EPA Sampling Team members and the CRL analytical staff possess the required training and qualifications to perform their functions for this project. No special training is anticipated for this project.

A9. DOCUMENTS AND RECORDS

The Quality Management Plan (QMP), Land and Chemicals Division, Region 5, May 2008, was used for preparation of this QAPP. Other documents that will be produced as a result of this project include a field notebook, an analytical report generated by CRL, and a Final Report generated by the Project Manager.

GROUP B. DATA GENERATION AND ACQUISITION ELEMENTS

B1. SAMPLING PROCESS DESIGN (EXPERIMENTAL DESIGN)

Complete sampling procedures may be found in the companion sampling plan. *See the site-specific SAP for this project (Appendix A).*

B2. SAMPLING METHODS

See the (Sampling analysis Plan (SAP) for this project. Appendix A.

B3. SAMPLE HANDLING AND CUSTODY

B3.1 Field Custody Procedures

The environmental samples will be maintained under custody at all times from collection until delivery to CRL. The CRL will maintain the samples under custody through analyses. The custody procedures to be followed mimic the EPA Samplers Guide to the CLP program EPA/540/R-96/032). CRL is the evidence file custodian. Complete field custody procedures to be used are also found in the SAP for this project.

B3.2 Laboratory Custody Procedures

CRL custody procedures for sample receiving and log-in, sample storage and numbering, tracking during sample preparation and analysis, and storage of data are described in the CRL QMP.

B3.3 Final Evidence File Procedures

All hard copy analytical data and chain-of-custody records shall be retained by the CRL following the analyses, with one copy provided to the Project Manager. The CRL shall review the data and provide a verification report. The hard copy analytical data, custody records and verification report shall be maintained in the CRL's secure, limited-access data storage area. This portion of the evidence file shall be stored at the CRL for a period of three years after which the records shall be offered to the Project Manager prior to permanent transfer to the Federal Records Center in Chicago. Each laboratory shall maintain all raw analytical data on magnetic media whenever possible for a period specified in their laboratory QAPP.

The Project Manager or his designee shall maintain the portion of the final evidence file including: field logbooks, photographs, drawings, field QA/QC reports, data assessment report, and final project report.

B4. ANALYTICAL METHODS

B4.1 Field Analytical and Measurement Procedures

Field paramters (temperature, pH, dissolved oxygen, oxidation-reductionpotential, and specific conductance) will be measured by use of an in-line flow-through cell. Readigns will be taken from a spigot near the well that has not been subjected to treatment (if available) to ensure collection of a representative sample. Field parameters will be read every 5 mintues. Sampling will commence

when the field paramters have stabilized. Stabilization will be presumed to have occurred when field parameters change by less than 0.1 pH unit, les than 0.2 degrees C, and less 10 percent change in specific conductance, oxidation reduction potential, and dissolved oxygen. If readings do not stabilize after 30 minutes, a sample will be collected anyway..

B4.2 Laboratory Analytical and Measurement Procedures

CRL Standard Operating Procedures (SOPs) will be used for all analytical procedures on this project. Appendix B and C contain all the analytical methods used in this project.

- The methods included are: CRL equivalent of 8260B

B5. QUALITY CONTROL

B5.1 Field Quality Control Checks

The primary quality control (QC) checks will be the collection of a sufficient amount of sample to assure adherence to the SAP. The sampling procedures consist only of collecting whole, intact lamps, and placing them in containers for safe transport to the laboratory. No special equipment will be used that could contaminate the lamps.

B5.2 Laboratory Quality Control Checks

These QC checks will primarily include initial and continuing calibrations, QC check samples, method blanks, and laboratory duplicates.

The QC limits are given in each method or procedure.

B5.3 Quality Assurance Objectives

B5.3.1 PRECISION

Precision is the degree to which data generated from replicate or repetitive measurements differ. Precision may be stated in terms of standard deviation, range, relative percent difference and relative range.

B5.3.1.1 Field Precision

B5.3.1.2 Laboratory Precision

Use CRL's standard Methodology for analysis of VOCs (8260 B equivalent)
Laboratory precision is determined using laboratory analytical duplicates. Precision is measured by the relative percentage difference in concentration between two samples. The precision objective for this event is for duplicates to match within 20% relative difference.

B5.3.2 ACCURACY

Accuracy is defined as the difference between a reported value and a known or accepted value.

B5.3.2.1 Field Accuracy

One Matrix spike duplicate MS/MSD collected per 20 samples.

B5.3.2.2 Laboratory Accuracy

Laboratory accuracy may be assessed through the use of spiked samples, check standards, and initial/continuing calibrations. If a matrix spike and matrix spike duplicate cannot be prepared to determine accuracy then the laboratory must use a laboratory blank and provide an explanation.

B5.3.3 COMPLETENESS

Completeness is defined as the measure of the percentage of the amount valid, acceptable data generated, relative to the amount of data that was expected to be collected. For this project, completeness objective is 100%.

B5.3.4 REPRESENTATIVENESS

B5.3.5 COMPARABILITY

All data collected during this project is intended to be comparable for all sampling locations by consistently using step wise sampling and analytical procedures.

B6. INSTRUMENT/EQUIPMENT TESTING, INSPECTION, AND MAINTENANCE

B6.1 Field Instrument and Preventative Maintenance

Flow thorugh cell will be checked prior to going into the field to verify that equipment is available and working properly.

B6.2 Laboratory Instrument and Preventative Maintenance

The Laboratory shall follow standard, established procedures. Any deviation should be cleared through the EPA quality assurance coordinator prior to analysis.

B7. INSTRUMENT/EQUIPMENT CALIBRATION AND FREQUENCY

B7.1 Field Instrument Calibration

pH, specific conductance, oxidation-reduction potential, and specific conductance for the devices that will be used to read the field parameters will be calibrated in the field prior to the start of

sampling according to the manufacturers specifications. Temperature is calibrated at the factory and does not require field calibration.

B7.2 Laboratory Instrument Calibration

Calibration procedures for laboratory instruments will consist of initial calibration, calibration verification and continuing calibration verification. For a description of the calibration procedures for a specific laboratory instrument, refer to the procedures and methods provided by CRL for running the required analyses.

CRL will maintain a sample logbook for each instrument which will contain at least, but not limited to the following information: instrument identification, serial number, date of calibration, analyst, calibration solutions run and the samples associated with these calibrations.

B8. INSPECTION/ACCEPTANCE OF SUPPLIES AND CONSUMABLES

B9. NON-DIRECT MEASUREMENTS

Not applicable.

B10. DATA MANAGEMENT

No separate quality assurance reports to management are expected for this project. The final project report shall include a quality assurance section that shall summarize the verification of field and laboratory data, any field or lab QA problems, field and lab audit results and proposed and/or implemented field corrective actions.

The CRL QA coordinator will ensure that a complete data package is delivered to the EPA Project Manager for verification in the agreed turn around time for CRL.

See Group B, Section B3, B3.3, Final Evidence File Procedures for data management procedures.

GROUP C. ASSESSMENT AND OVERSIGHT ELEMENTS

C1. ASSESSMENTS AND RESPONSE ACTIONS

The Project QA Coordinator has the responsibility for conducting Performance and System Audits, as needed.

C1.1 Field Performance and Systems Audits

U.S. EPA Field Audits will not be required for this project, since U.S. EPA staff will be conducting the field sampling.

C1.2 Laboratory Performance and Systems Audits

No project-specific laboratory audits by the U.S. EPA of the CRL are expected prior to the initiation of sampling. CRL has undergone several quality systems audits prior to this project.

C1.3 Assessing Data Precision, Accuracy and Completeness

C1.3.1 PRECISION ASSESSMENT

Precision shall be assessed using relative percent difference (RPD) calculated as:

$$RPD = \frac{D1 - D2}{(D1 + D2)/2} \times 100\%$$

where, D1= investigative sample result
D2= duplicate sample result

C1.3.2 ACCURACY ASSESSMENT

Accuracy may be assessed using % recovery of spiked or surrogate standard sample results calculated as:

$$\% \text{ Recovery} = \frac{(SSR - SR)}{SA} \times 100\%$$

where, SSR = Spiked or surrogate sample result
SR = Unspiked sample result
SA = Amount of spike or surrogate added

C1.3.3 COMPLETENESS ASSESSMENT

Completeness is defined as the percentage of the amount of valid data obtained relative to the amount of data which was expected to be collected.

$$\text{Completeness} = \frac{\text{Amount of valid data obtained}}{\text{Amount of data expected to be collected.}} \times 100\%$$

C1.4 CORRECTIVE ACTION

The need for corrective action during the project may be determined at several points: during field activities, during lab activities and during data validation & assessment. All corrective action procedures will be reviewed with the assigned EPA QA Contact and documented in the final report.

C1.4.1 Field Corrective Action

Corrective action in the field may be necessary due to quality assurance problems during sampling that were not anticipated in this QAPP. In general, the need for corrective action will be identified by the field team leader. Corrective action should be approved by the assigned EPA QA Contact prior to initiation. The field team leader may consult other technical staff (i.e. CRL, risk assessors, senior geologists, etc.) regarding potential corrective actions where data quality is an issue.

C2. Reports to Management

The final project report shall include a QA section that shall summarize the verification of field and laboratory data, any field or laboratory QA problems, field and laboratory audit results and proposed and/or implemented field corrective actions. The report will also discuss the field activities and analytical results. Details on the reporting requirements for this project can be found in the SAP (Appendix A).

GROUP D. DATA VALIDATION AND USABILITY ELEMENTS

D1. DATA REVIEW, VERIFICATION, AND VALIDATION

The EPA Project Manager will record all qualitative descriptions, diagrams of the sample area, sample locations, and the name of the EPA Field Team Member collecting each sample in a log book. A photo log of the sampling event will also be produced.

D2. VERIFICATION AND VALIDATION METHODS

D2.1 Laboratory Data Reduction

CRL data reduction procedures for the analyses are specified in each section of the CRL's SOPs.

D2.2 Laboratory Data Verification

CRL data verification procedures for the analyses are specified in each section of the CRL's SOPs.

D2.3 Laboratory Data Validation

The Project manager will rely on the information contained in the data package and laboratory report, as provided by the CRL, for validation of the data generated in this project.

D2.4 Laboratory Data Reporting

The CRL shall follow standard, established procedures. Any deviation from the procedures should be cleared through the U.S. EPA QA contact before execution.

D3. RECONCILIATION WITH USER REQUIREMENTS

D3.1 Laboratory Corrective Action

All laboratories will follow standard, established procedures. Any deviation from standard procedures should be cleared through the U.S. EPA QA contact before execution.

D3.2 Corrective Action During Data Verification and Data Assessment

The need for corrective action may be identified during the data verification process conducted by the CRL. If the corrective action requires re-analyzing the sample, the laboratory QA coordinators in conjunction with analysts shall determine whether the samples are within holding time and whether sufficient sample remains for re-analysis.

If data are determined to be unusable, results are estimated quantitatively or the samples cannot be re-analyzed, the EPA QA Contact and the field team leader will be advised of the situation by the CRL. The U.S. EPA Project Manager can then determine the feasibility of re-sampling or accepting the limitations of the data.

APPENDIX A

Techalloy Company Inc,
6509 Olson Road
Union, IL 60180
EPA ID # ILD 005 178 975

SAMPLING AND ANALYSIS PLAN

10/02/08

This Land and Chemicals Division Generic Field Sampling Plan provides guidance for the preparation of project-specific field sampling plans (FSPs) for the collection of environmental data. Default generic sampling and analytical protocols are included which may be used verbatim or modified based upon project-specific data quality objectives (DQOs – See Generic QAPP). The goal of this document is to promote consistency in the generation and execution of sampling and analysis plans and thus to help generate chemical data of known quality for its intended purpose.

This manual applies to all LCD sampling events conducted by EPA Region 5 Land and Chemicals Division Staff having responsibility for sampling and analysis of environmental samples within their branch. This includes, but is not limited to RCRA Branch inspectors, Remediation and Reuse Branch (RRB) project managers, Chemicals Management Branch inspectors, and others having activities pursuant to and in support of execution of the following programs: the Resource Conservation and Recovery Act (RCRA), the Toxic Substances Control Act (TSCA), the Emergency Planning and Community Right-to-Know Act (EPCRA), and the Federal Insecticide, Fungicide, and Rodenticide Act (FIFRA).

Prepared by:

U.S. Environmental Protection Agency
Land and Chemicals Division
77 W. Jackson Boulevard
Chicago, Illinois 60604

Release 1.0 – May 2008

TABLE OF CONTENTS

LIST OF ACRONYMS

CFR	Code of Federal Regulations
CRL	Central Regional Laboratory (Change laboratory if necessary)
LCD	Land and Chemicals Division
PPE	Personal Protective Equipment
QA	Quality Assurance
QAPP	Quality Assurance Project Plan
QC	Quality Control
QMP	Quality Management Plan
RCRA	Resource Conservation and Recovery Act
RSD	Relative Standard Deviation
SAP	Sampling and Analysis Plan
SOP	Standard Operating Procedure
TCLP	Toxicity Characteristic Leaching Procedure
U.S. EPA	Environmental Protection Agency

1. INTRODUCTION

This Sampling and Analysis Plan (SAP) has been prepared by the United States Environmental Protection Agency (U.S EPA) as a project planning document for the **SAMPLING AND ANALYSIS of Contaminants (Volatile Organic Compounds, VOC)** at **Techalloy Company Inc**, located at **Union, IL**.

This SAP summarizes the field and laboratory tasks necessary to sample and analyze **(residential well water samples)**. The objective of this effort is to determine if (volatile organic compounds from the residential well water samples are below maximum contaminant limit (MCL)).. Upon completion, the data will be used by the U.S. EPA to assess Techalloy's compliance with the regulations pertaining to corrective action responsibilities.

The U.S. EPA Region 5 LCD Quality Assurance Project Plan (QAPP) Techalloy presents detailed information about U.S. EPA's quality assurance (QA) and quality control (QC) protocols for sampling and analysis activities in Region 5. This site-specific SAP will supplement the plan with information that is specific to this project. Both this site-specific SAP and the QAPP are subordinate to, and consistent with, the U.S. EPA Region 5 LCD Quality Management Plan (QMP) of May 2008.

The QMP establishes U.S. EPA Region 5 LCD's quality system for sampling work assignments. The QMP also defines requirements for control of accountable documents and records, provides the strategy for assessing the effectiveness and implementation of the overall quality system, describes the roles of and interrelationships between the various QA/QC plans, and describes how the quality of work will be controlled.

This SAP is a sub-tier document to the QAPP, which outlines the general requirements and protocols for waste sampling and analysis activities performed by U.S. EPA Region 5 LCD. The QAPP was designed to comply with and support the Region's quality management policies as prescribed in *EPA Requirements for Quality Assurance Project Plans* (QA/R-5), *EPA Guidance for Quality Assurance Project Plans* (QA/G-5), *EPA Quality Manual for Environmental Programs (EPA 5360)*, and *Specifications and Guidelines for Quality Systems for Environmental Data Collection and Environmental Technology Programs* (ANSI/ASQC E4-1994). In addition, the QAPP provides guidance and requirements for developing and implementing site SAPs that are also compliant with these reference documents.

The remainder of this document describes the tasks associated with sample collection, handling, shipment, and analysis.

1.1 PROJECT HISTORY AND SUMMARY

Techalloy Company, Inc. is located in Section 4, T43N, R6E of McHenry County, IL (Figure 1) at 6509 Olson Rd., just east of the Village of Union corporate limits. The property is the site of an operational metal manufacturing plant. The Techalloy plant was built in 1959 (Buildings 1 and 2 originally) and stainless steel processing operations began in 1960. At the time, the process included cleaning finished wire with trichloroethene with rags, by hand. As the business grew, by the mid 1960s and 1970s vapor degreasing and dip tanks were used for cleaning larger amounts of wire. In the 1970s and early 1980s, 1,1,1-trichloroethane was used for cleaning and was deemed to be safer for the employees. Trichloroethene was used at the site until the early 1980s. In 1990, the Techalloy Union Plant was in the process of being sold. It was and is standard practice to conduct a Phase I Environmental Site Assessment (ESA) to determine if there were any unknown environmental liabilities that could impact the future owner. The Phase I ESA determined that there was the potential for environmental impact from site activities. As a result, a Phase II ESA was conducted which included the collection and analysis of environmental samples. The samples confirmed that groundwater contained VOCs. This finding led to an Order on Consent with the U.S.EPA resulting in Techalloy conducting a RCRA Remedial Facility Investigation (RFI) and a Corrective Measures Study (CMS) to delineate the extent and impact from the VOCs in groundwater.

The selected corrective measures included the construction and operation of a groundwater extraction and treatment facility to intercept the VOC plume, treatment of the groundwater by air stripping and discharging the treated water to the South Branch of the Kishwaukee River. The system was installed in 1997 and enlarged in 1998 with the addition of a second extraction well and a second stripping system. It has been treating groundwater since that time. In 2001, an air sparging and soil vapor extraction facility was constructed to remove VOCs from soil in the source (plant) area.

In 2006, two sod farm wells were installed offsite and down gradient of the groundwater plume. Due to the high pumping capacity of these wells, the plume has expanded and chlorinated solvents have recently been detected at concentrations above drinking water standards in the sentinel wells. Following this observation, Techalloy sampled the majority of the residential and commercial wells downgradient of the plume.

1.2 PURPOSE OF THE STUDY

The purpose of this sampling and analyses is to determine the validity of the conceptual groundwater model which concludes that the down gradient contaminant plume is not impacting the residential wells and also to verify Techalloy's sampling results. This sampling event will check if the detected volatile organic compounds are below the Maximum contaminant limit (MCL).

1.3 SAMPLING AREA

The following table provides the actual sampling locations for this project. These wells are down gradient to the contaminated plume.

Owner of Residential Well	Depth of Well	Screened Interval	Address
Non-responsive	Deep well- 70 Feet	40 to 70 Feet	Non-responsive
	Deep well - 85	50 to 80 Feet	
	Shallow well - 25	Point	
	Shallow well	Point	
	Shallow well	Point	
	Shallow Well		
	Intermediate well 50 feet	Point	
	Shallow well – 30 feet	Point	
	Deep well – 250 feet Flag Pole -30	Cracked Lime & Shallow	
	Well in "93" - 67" Bottled water due to NO		
	Intermediate Well 30" Bottled water due to NO	Point	
	Bottled water due to NO	Point	
	Deep-67" 5" well used for irrigation. Bottled Water		
	Shallow Well 30" Drinking Tap Water	Point	

Shallow well -10 feet to 30 feet
Intermediate well – 30 feet to 60 feet
Deep well – 60 feet to 90 feet

1.4 FIELD SAMPLING AND ANALYSIS PLAN ORGANIZATION

This SAP presents the methods used to conduct the field investigation, document the field activities, analyze the samples, and ensure the health and safety of the field team during sampling activities. Section 2 discusses field methods for sample collection and Section 3 describes the documentation and reporting requirements for the project. Section 4 refers to the laboratory procedures and analyses and Section 5 discusses the health and safety measures that will be followed by the Project Team Members in the field.

1.5 PROJECT TEAM

The project team is as follows:

Bhooma Sundar, Corrective Action Section 2 (CAS2), RRB, LCD
Project Manager, U.S. EPA, Region 5, Chicago

Allen Debus,CAS2, RRB, LCD Assigned QA Contact, U.S. EPA, Region 5, Chicago
Bob Kay, USGS, Project Assistant, U.S. EPA, Region 5, Chicago
Brian P. Freeman, Currently LCD/CRL Coordinator, U.S. EPA, Region 5, Chicago
Marilyn Jupp, Currently CRL QA Coordinator, U.S. EPA, Region 5, Chicago

2. SAMPLING AND ANALYSIS

2.1 CONTAMINANTS OF POTENTIAL CONCERN

The following table provides chemicals of concern and the corresponding MCL

Chemical	Method	Units	MCL = 'Decision' or 'Action' levels
Vinyl Chloride	8260B	µg/l	2
Chloroethane	8260B	µg/l	---
1,1 - Dichloroethane	8260B	µg/l	7
Methylene Chloride	8260B	µg/l	---
Total 1,2-dichloroethene	8260B	µg/l	170
1,1- dichloroethane	8260B	µg/l	---
1,1,1-trichloroethane	8260B	µg/l	200
1,2-dichloroethane	8260B	µg/l	5
Trichloroethene	8260B	µg/l	5
Toluene	8260B	µg/l	1000
1,1,2- Trichloroethane	8260B	µg/l	5
Tetrachloroethene	8260B	µg/l	5
Total xylenes (m,o&p)	8260B	µg/l	10,000

Note that for several compounds, MCLs haven't been established. Results for chloroethane, methylene chloride and 1,1 – dichloroethane should be reported using CRL's standard reporting limit protocol.

2.2 PROPOSED SAMPLING LOCATIONS

Refer section 1.3 for actual sampling locations in the study area at Union, IL

2.3 SAMPLE DESIGNATION AND PROCESSING

A unique log number is assigned to each sample by the Project Manager assigned to this project. These log numbers are then recorded by the sampling team on sample tags, in the field log books, on the chain of custody sheets, and on appropriate laboratory data sheets.

Each vial will constitute its own sample, and sample tags will be attached to each vial. The vials will then be placed in plastic bags. All samples will be labeled and identified in accordance with section 3.1.

2.4 EQUIPMENT DECONTAMINATION

No special equipment will be used during the sampling. Therefore, equipment decontamination is not anticipated.

2.5 CONTAMINATED EQUIPMENT MANAGEMENT

Disposable equipment will be used during the sampling. Therefore, equipment decontamination is not anticipated. The U.S. EPA Project Team Members will use their judgment in determining if they have generated any contaminated objects or materials during their sampling activities. Any contaminated materials will be placed in a large trash bag and transported back to **CRL** for proper management or, with consultation of Bhooma Sundar, will be disposed of with Techalloy's solid/hazardous waste.

2.6 SAMPLE DOCUMENTATION AND CHAIN OF CUSTODY

Chain-of-custody forms, sample labels, custody seals, and other sample documents will be completed as specified in the Quality Assurance Project Plan (QAPP). Copies of the chain-of-custody forms will be retained with the project files. The sample team or any individual performing a particular sampling activity is required to maintain a field logbook. These field logbooks will be bound, and contain entries of investigation operations as the activities proceed. The logbooks are expected to be maintained by the Project Manager or his designee.

3. PROJECT DOCUMENTATION, SAMPLING, AND REPORTING

3.1 PROJECT DOCUMENTATION

The primary types of documentation that will be used for this project include field logbooks, photographs, photo logs, sample log forms, and sample tracking forms. The field logbooks are vital for documenting all on-site activities. Photo documentation will be used to provide an accurate account of the material sampled, sample locations, and environmental conditions. Sample log forms are used to summarize data collected for various sample locations. The field logbooks are used to document any modifications made to the original project plans during field activities. Sample tracking forms include the chain-of-custody form, sample labels (or tags), and custody seals. The chain-of-custody form is used to track sample custody, which is an important aspect of field investigation activities that documents the proper handling and integrity of the samples. Sample labels are used to provide essential information and identification for all samples collected during field activities. Custody seals are used on all sample shipments to detect any tampering that may have occurred during transport or shipment. A description of each of these documentation methods is provided in the following sections.

3.1.1 Field Logbooks

The field logbooks will be used to document all field sampling activities performed at the project site. The logbooks will contain the date, time, and description of all field activities performed; names of personnel; weather conditions; the names of visitors to the site; areas where photographs were taken; and any other data pertinent to the project. The field logbooks will also contain all sample collection and identification information and a drawing of the area sampled, along with the approximate location of where each sample was taken. The sampling information will be transferred to sample log forms when the sampler returns to the office. The logbook is the official, legal record of site activities, and will serve as the key to sample designations and locations, and will include the date, time, site/sample location, sample identification number, sample matrix, how the sample was collected, any comments, and the sampler's name.

Each page of the field logbook will be numbered, dated, and signed by the author. The logbooks will be sturdy, preferably weatherproof, and bound to prevent the removal of pages. All writing will be done in waterproof, black, permanent ink. No pages may be removed from the field logbooks for any reason. Blank pages, if any, will be marked "page intentionally left blank." Any mistakes will be crossed out with a single line, initialed, and dated. If multiple logbooks are used, they will be numbered sequentially.

3.1.2 Photo Documentation

Photographs will be taken of the total sample area and of each sample. These photos will help identify the location and will provide an accurate visual record of the material being sampled. All photographs taken will be identified in the field logbooks (preferably in a separate section of the book set aside for that purpose). Photographic logs will contain, at a minimum, the film roll number, the photo number, the date, the time, the name of the photographer, and a description of the image in the photograph.

3.1.3 Sample Collection Information Form

Sampling logs and collection forms will be used to document site and sample characteristic data, which should agree with the information recorded in the field logbooks. Field personnel are required to fill out one sample log form for each sample collected. These forms will be stored in the project file. A copy of these forms will also be included in the final data report and other documents, as appropriate. At a minimum, the log for each sample will contain the sample number, the date and time of sample collection, and a description of the sampling site, as well as the physical characteristics of the sample, the name of the sampler(s) and the name of the person recording the observations.

3.1.4 Field Change Procedure

When in the field, it may be necessary to deviate from the procedures outlined in this plan. It will ultimately be the responsibility of the Project Manager to decide when such changes are to be made. When it becomes necessary to modify a program or task, the changes will be documented in the field logbook. All field changes will be numbered consecutively starting with the number 001.

3.1.5 Sample Tracking Forms

Sample tracking is an important aspect of field investigation activities, as it documents the proper handling and integrity of the samples. Sample tracking forms to be used for the project will include chain-of-custody forms, sample labels, custody seals, and sample summary logs.

3.1.6 Chain-of-Custody Form

Internal laboratory records will document custody of the sample from the time it is received in the lab through its final disposition. The chain-of-custody form will be filled out after the samples have been collected and will be double-checked prior to the transport of the samples to the laboratory. At a minimum, the chain-of-custody form will contain the following information:

- Name of project
- Names of samplers/processing personnel
- Sample identification numbers
- Sampling date
- Sampling time
- Number and type of containers per sample
- Analysis requested

3.2 SAMPLING DOCUMENTATION

The following sections describe documentation with sampling and handling procedures.

3.2.1 Sample Labels

Each sample vial collected will be clearly labeled with a handwritten Region 5 sample tag. The tag will be attached to the vial itself. Waterproof black ink will be used to mark the tag. Sample labels will contain the following information:

- Sample identification numbers
- Sample date

- Sample time
- Preservation used, if any
- Analysis requested
- Initials of samplers/processors

Information on the sample label must match the information on the chain-of-custody form and in the field logbook for each sample.

3.2.2 Custody Seals

Custody seals will be used on the vials containing the samples. If coolers are used to aid in transport, custody seals will be attached to each cooler to detect any tampering during shipment. The seal numbers of each lamp will be recorded on the chain-of-custody form.

3.2.3 Sample Summary Log

Sample summary logs will be maintained by the Assigned QA Contact and used to keep track of all phases of the sampling and analysis process for all individual samples. The summary sample logs will include sample collection dates, sample delivery dates, and dates analytical results are received, along with any other relevant information.

3.2.4 Sample Custody/Tracking Procedures

The samples collected must be traceable from the time they are collected until they or their derived data are used in the final report. In general, the following provisions apply to sample handling:

- The Project Manager will be responsible for the care and custody of the samples collected until they are properly transferred or dispatched to the laboratory.

- All appropriate documentation forms will be used, including sample labels, chain-of-custody forms, sample logs and any other appropriate forms. Documentation will be completed neatly using waterproof, black ink.

- When transferring possession of samples, the individuals relinquishing and receiving them will sign, date, and note the time on the chain-of-custody form.

- Samples will be packed in plastic bags, each bag will be taped shut and sealed with an EPA custody seal. The seal number will be recorded on the chain-of-custody form. The bagged samples may be placed in cardboard boxes with bubble wrap to prevent damage of the samples in transit. The cardboard boxes will be securely sealed with packing tape.

- A copy of the chain-of-custody form will be retained by the Project Manager for inclusion in project records.

All samples will be transported to the CRL by the Project Team and hand delivered to the laboratory.

3.3 REPORTING

Reporting for this project includes laboratory reports and the final report. CRL will prepare all reporting for laboratory activities.

3.3.1 Laboratory Reports

Final written laboratory reports will be required for chemical analyses. A laboratory report will be prepared by CRL for all laboratory procedures. Final written laboratory reports and data deliverables should contain the following, as applicable based on the method applied:

- Case narrative
- Identification of all protocols
- Summary results of initial and continuing calibration
- Method and instrument blanks
- All field sample and field QA/QC sample results
- Supporting raw data and spectra
- Supporting sample tracking information (e.g. shipping forms, chain-of-custody forms)
- Supporting documentation on any corrective actions

Initial calibration information must include concentrations of each standard analyzed, response factors for each analyte at each standard concentration, relative standard deviation (RSD) (or correlation coefficient for metals analytes) and over all standards for individual analytes. The RSD control limit range must also be indicated in the initial calibration summary data.

Continuing calibration information must include the response factor for each analyte, and the calculated percent difference as compared to initial calibration. Control limits for each analyte must also be indicated on each continuing calibration summary data sheet.

Method blank and field sample data pages must indicate the method reporting limit and the dilution factor. Surrogate reporting forms must list control limits for surrogate recovery. Spike

reporting forms (blank and matrix spikes) must indicate spike percent recovery and relative percent difference control limits (if spikes are analyzed in duplicate).

Documentation of detection limits (detection limit studies) and results of performance evaluation samples (supplied by regulatory agencies or purchased from certified vendors) are not required for the data deliverable. However, these records must be supplied upon request. Total measurement error determination for field duplicate samples will be calculated. Electronic data deliverables will also be required.

3.3.2 Quality Assurance Report

No separate Quality Assurance Report is expected for this project. The final report will include a section on quality assurance. The Project Manager will prepare this section based upon activities involved with the field sampling and review of the CRL laboratory analytical data. The laboratory quality assurance/quality control (QA/QC) reports and any data package validation reports will be incorporated into the QA section by reference. This section will identify any field and laboratory activities that deviated from the approved sampling plan and the referenced protocols and will make a statement regarding the overall validity of the data collected.

3.3.3 Final Project Report

A final written report will be prepared documenting all activities associated with collection, compositing, transportation of samples and chemical and physical analysis of samples. The chemical and physical laboratory reports (or appropriate summaries) will be included as appendices. At a minimum, the following will be included in the final report:

- Brief description of the project and its objectives
- Type of sampling equipment used
- Identification and description of protocols used during sampling and testing and an explanation of any deviations from the sampling plan protocols
- Description or summary of sampling and compositing procedures
- Descriptions of each sample (i.e., sample logs)
- Summary of methods used to locate the sampling positions and a discussion of the position accuracy
- A plan view of the project showing the actual sampling locations

- Summary of all test results and data (hard copy and electronic)
- QA

In addition to the items listed above, the final report will include an electronic file of sample location information (i.e., sample ID, sample type, coordinates and sample data).

4. LABORATORY ANALYSIS

The laboratory procedures associated with physical and chemical testing applicable to this project can be found in appendixes B and C of the QAPP. CRL's 8260 B equivalent will be performed on all samples.

5. HEALTH AND SAFETY PLAN

This section describes the health and safety procedures which will be used for the project.

Standard safety practices as outlined in the EPA manual Safety and Health in EPA Field Activities will be followed during this survey.

For sampling activities, the field personnel will need to use the following PPE:

- Cold weather gear as appropriate to conditions
- Disposable rubber/latex or nitrile gloves
- Safety glasses with side shield
- full face respirator (if deemed necessary based on site conditions)
- Steel-toed safety boots

The following telephone numbers are for emergency services:

- Police, Fire Department, Ambulance: 911

The following hospital will be used in case of an emergency:

Memorial Medical Center, Woodstock, IL 815-334-5090

APPENDIX B

STANDARD OPERATING PROCEDURE FOR THE MEASUREMENT OF ACIDS AND BASE/NEUTRAL ORGANIC COMPOUNDS IN WATER AND SOILS BY GAS CHROMATOGRAPHY/MASS SPECTROMETRY

CRL SOP MS026

UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
REGION 5 CHICAGO REGIONAL LABORATORY
536 SOUTH CLARK STREET (ML-10C)
CHICAGO, ILLINOIS 60605

Revision 6.2 Date: June 11, 2007

Date of Last Approval Revision 6.1: May 22, 2006

Effective Date:

JUL 2 0 2007

US EPA CRL

Concurrences:

Originator: Troy Strock 7/13/07

Group Leader: Roger Rudinsky 7/17/07

QA/SampleCoordinator: Marilyn Jupp 7/19/07

Deputy Director: George Schupp 7/20/2007

APPENDIX B

CRL SOP MS023

STANDARD OPERATING PROCEDURE FOR MEASUREMENT OF PURGEABLE ORGANIC COMPOUNDS IN WATER BY CAPILLARY COLUMN GAS CHROMATOGRAPHY/MASS SPECTROMETRY

UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
REGION V CHICAGO REGIONAL LABORATORY
536 SOUTH CLARK STREET
CHICAGO, ILLINOIS 60605

Modified: April 25, 2008

Effective on Date of Last Signature

Signature & Title

Originator Olga Grang Chemist

Group Leader 4/28/08

QA/Sample Coordinator Marilyn Jupp 4/28/08

CRL Deputy Director 4/29/2008

CRL SOP MS023

STANDARD OPERATING PROCEDURE FOR
MEASUREMENT OF PURGEABLE ORGANIC COMPOUNDS IN
WATER BY CAPILLARY COLUMN
GAS CHROMATOGRAPHY/MASS SPECTROMETRY

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LAND AND CHEMICALS DIVISION
QUALITY ASSURANCE PROJECT PLAN
For Field Sampling Events

Techalloy Company Inc,
6509 Olson Road
Union, IL 60180
EPA ID # ILD 005 178 975

9/29/08

A1. Approvals

PREPARED BY:

_____Bhooma Sundar_____
Land and Chemicals Division, U.S. EPA, Region 5

APPROVED BY: _____
Assigned QA Contact
Land and Chemicals Division, U.S. EPA Region 5

APPROVED BY: _____
Section Chief Responsible for Sampling Event
Land and Chemicals Division, U.S. EPA Region 5

APPROVED BY: _____
Branch Chief Responsible for Sampling Event
Land and Chemicals Division, U.S. EPA, Region 5

Prologue

A QAPP is designed to focus primarily on :

1) the Data Quality Objectives for the event, (the end result of what the data will be used for),
2) the boundaries of the sampling event (the population that the samples taken herein represent)
3) the acceptance or rejection of the problem posed in the event (the hypothesis)

The QAPP also outlines the analytical methods and QA/QC procedures that are used to analyze the samples and manage the data. The QAPP should include the organization and responsibilities of project laboratory and data assessment personnel; QA objectives; sample receipt, handling, custody, and holding time requirements; analytical procedures, equipment preventive maintenance, calibration, internal quality control procedures, and performance/system audits; data reduction, review, and reporting; and data assessment, data usability, and DQO reconciliation. Additional information may be obtained from EPA QA/R-5, EPA QA/G-5, and other references.

A2. TABLE OF CONTENTS

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LIST OF ACRONYMS	
CERCLA	Comprehensive Environmental Response, Compensation, and Liability Act
CRL	Central Regional Laboratory, U.S. EPA Region 5
DQO	Data Quality Objective
FSP	Field Sampling Plan
QA	Quality Assurance
QAPP	Quality Assurance Project Plan
QMP	Quality Management Plan
QC	quality control
RCRA	Resource Conservation and Recovery Act
RPD	relative percent difference
SA	amount of spike or surrogate added
SAP	Sampling and Analysis Plan
SOP	Standard Operating Procedure
SSR	spiked or surrogate sample result
SR	unspiked sample result
U.S. EPA	U.S. Environmental Protection Agency

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CRL METHODS USED	APPENDIX B
SUBCONTRACT LAB METHODS USED (If necessary)	APPENDIX C

A3. DISTRIBUTION LIST

The management, quality assurance, laboratory and field responsibilities are as follows for the United States Environmental Protection Agency (U.S. EPA) sampling event:

U.S. EPA LCD Project Manager – Bhooma Sundar
U.S. EPA LCD Project Assistant – Robert Kay
U.S. EPA LCD QA Contact – Allen Debus
U.S. EPA LCD/CRL Coordinator/REPA COR – (Currently) Brian P. Freeman
U.S. EPA CRL QA Coordinator – (Currently) Marilyn Jupp

A4. PROJECT/TASK ORGANIZATION

A4.1 EPA Project Management

A4.1.1 EPA Project Manager

The EPA Project Manager is Bhooma Sundar, and is responsible for all project activities, and will coordinate field activities.

A4.1.2 EPA Project Assistant

The EPA Project Assistant is Robert Kay (USGS), and is responsible for assisting the EPA Project Manager in all project activities, and will assist in coordinating field activities.

A4.2 Quality Assurance Responsibilities

A4.2.1 EPA Quality Assurance Coordinator

The EPA Quality Assurance Contact is Allen Debus, and is responsible for review of the QAPP.

A4.2.2 EPA CRL Analytical and QA Responsibilities

The *Central Regional Laboratory (CRL)* be responsible for conducting analyses, ensuring that the CRL quality assurance program is implemented, and preparing a report of CRL analyses and quality assurance for the Project Manager. The CRL QA coordinator will ensure that the appropriate standard operating procedures (SOPs) are followed, and that a complete data package is delivered to the EPA Project Manager in the agreed turn around time with CRL.

A4.2.3 U.S. EPA Project Manager Responsibilities

The **U.S. EPA Project Manager** is ultimately responsible for all activities at the site, and coordinating with CRL to complete all proper analyses.

In addition, he or she is responsible for the following:

- preparation of the sampling plan based on site knowledge
- performing and oversight of sample collection activities
- ensuring that the sampling plan and QAPP are followed by the field team

A4.2.4 U.S. EPA Field Team Responsibilities

The **U.S. EPA Field Team** is responsible for the following:

- sample collection
- photo documentation of the sampling event
- completely recording the details of the sampling event in a log book
- ensuring the QAPP and sampling/safety plans are implemented
- delivering the environmental samples from the field to CRL
- preparing a report of field activities and field quality assurance
- ensuring that chain-of-custody procedures are followed from time of sample collection to arrival of the sample at the laboratory

A4.3 Laboratory Responsibilities (EPA CRL)

CRL is responsible for analysis (~~**USING ANALYTICAL METHODS FILLED IN HERE**~~) to determine the concentration of Volatile Organic Compounds (VOC) in the samples. ~~The samples will not be analyzed for mercury content.~~

A complete data package for each analysis shall ~~be composed~~, and ~~adherence to all~~ CRL analytical ~~methods~~ and procedures shall be ~~required~~.

A4.4 Field Responsibilities

The U.S. EPA Field Team will be responsible for the sample collection and preparation of the samples, initiating and maintaining chain-of-custody, and delivering all samples to CRL.

A5. PROBLEM DEFINITION/BACKGROUND

A5.1 Site History

Techalloy is located in Section 4, T43N, R6E of McHenry County, IL (Figure 1) at 6509 Olson Rd., just east of the Village of Union corporate limits. The property is the site of an operational metal manufacturing plant. The Techalloy plant was built in 1959 (Buildings 1 and 2 originally) and stainless steel processing operations began in 1960. At the time, the process included cleaning finished wire with trichloroethene with rags, by hand. As the business grew, by the mid 1960s and 1970s vapor degreasing and dip tanks were used for cleaning larger amounts of wire. In the 1970s and early 1980s, 1,1,1-trichloroethane was used for cleaning and was deemed to be safer for the employees. Trichloroethene was used at the site until the early 1980s. In 1990, the Techalloy Union Plant was in the process of being sold. It was and is standard practice to conduct a Phase I

Environmental Site Assessment (ESA) to determine if there were any unknown environmental liabilities that could impact the future owner. The Phase I ESA determined that there was the potential for environmental impact from site activities. As a result, a Phase II ESA was conducted which included the collection and analysis of environmental samples. The samples confirmed that groundwater contained VOCs. This finding led to an Order on Consent with the U.S.EPA resulting in Techalloy conducting a RCRA Remedial Facility Investigation (RFI) and a Corrective Measures Study (CMS) to delineate the extent and impact from the VOCs in groundwater.

The selected corrective measures included the construction and operation of a groundwater extraction and treatment facility to intercept the VOC plume, treatment of the groundwater by air stripping and discharging the treated water to the South Branch of the Kishwaukee River. The system was installed in 1997 and enlarged in 1998 with the addition of a second extraction well and a second stripping system. It has been treating groundwater since that time. In 2001, an air sparging and soil vapor extraction facility was constructed to remove VOCs from soil in the source (plant) area.

In 2006, two sod farm wells were installed offsite and down gradient of the groundwater plume. Due to the high pumping capacity of these wells, the plume has expanded and chlorinated solvents have recently been detected at concentrations above drinking water standards in the sentinel wells. Following this observation, Techalloy sampled the majority of the residential and commercial wells downgradient of the plume.

A5.2 Sampling Area

The following table provides the actual sampling locations that are downgradient to the contaminated plume and situated between the extraction wells and high pumping capacity

Owner of Residential Well	Depth of Well	Screened Interval	Address
Non-responsive	Deep well- 70 Feet	40 to 70 Feet	Non-responsive
	Deep well - 85	50 to 80 Feet	
	Shallow well - 25	Point	
	Shallow well	Point	
	Shallow well	Point	
	Shallow Well		
	Intermediate well 50 feet	Point	
	Shallow well – 30 feet	Point	
	Deep well – 250 feet Flag Pole -30	Cracked Lime & Shallow	
	Well in "93" - 67" Bottled water due to NP		
	Intermediate Well 30" Bottled water due to NP	Point	
	Bottled water due to NP	Point	
	Deep-67" 5" well used for irrigation. Bottled Water		
	Shallow Well 30" Drinking Tap Water	Point	

Shallow well -10 feet to 30 feet
Intermediate well – 30 feet to 60 feet
Deep well – 60 feet to 90 feet

irrigation wells.

A5.3 Project Purpose

The Techalloy facility collects residential samples semi annually. The purpose of this sampling event is to check the validity of the conceptual groundwater model which concludes that the down gradient contaminant plume is not impacting the residential wells and also to verify Techalloy's sampling results. This sampling event will check if the detected volatile organic constituents are below the Maximum contaminant limit (MCL). The following table provides chemicals of concern and the corresponding MCL

Chemical	Method	Units	MCL
Vinyl Chloride	8260B	µg/l	2
Chloroethane	8260B	µg/l	---
1,1 - Dichloroethane	8260B	µg/l	7
Methylene Chloride	8260B	µg/l	---
Total 1,2-dichloroethene	8260B	µg/l	170
1,1- dichloroethane	8260B	µg/l	---
1,1,1-trichloroethane	8260B	µg/l	200
1,2-dichloroethane	8260B	µg/l	5

Note that for several compounds, MCLs haven't been established. Results for chloroethane, MeCl2 and 1,1-DCA should be reported using CRLs standard reporting limit protocol.

Chemical	Method	Units	MCL
Trichorethene	8260B	µg/l	5
Tolune	8260B	µg/l	1000
1,1,2- Trichloroethane	8260B	µg/l	5
Tetrachloroethene	8260B	µg/l	5
Total xylenes (m,o&p)	8260B	µg/l	10,000

A6. PROJECT/TASK DESCRIPTION

A6.1 Existing Information
Refer Section A.5.1

A6.2 Task to be Performed
As described in the narrative and table of section A.5.3

A7. QUALITY OBJECTIVES AND CRITERIA

Project Data Quality Objectives (DQOs) provide criteria against which project performance can be evaluated to determine whether overall project QA objectives are met.

Problem definition.
See Section A5.3

Decision to be made.
Concentrations of an analyte greater than MCL reveals a violation.

Inputs to the Decision.
Inputs include the following: Analytical method reporting limits lesser than MCL per table in section A5.3 (for which MCLs have been established) or detailed quantitation of chemicals of concern.

Study Boundaries.

Decision Rule
Concentrations of an analyte greater than MCL reveals a violation.

Limits on Decision Errors. The decision rules will be applied using valid data derived from the samples. Samples will be selected to be representative of existing conditions. Data quality requirements specific to the method for precision and accuracy will be used to determine the validity or usability of the data. The method precision and accuracy requirements are defined in the individual laboratory procedures and the laboratory QAPP.

Optimize the Design. The locations of possible sources, technical characteristics of the contaminants, and the media in which they are present have been used to determine a cost-effective

design for the sample collection. This study will be performed to minimize the number and type of samples collected while supplying sufficient data upon which to apply the decision rules.

A7.1 Project Schedule/Time Table

The time table for this project is as follows:

Table 1. Estimated Project Schedule

Activity	Date
QAPP/Sampling and Safety Plan Approved	DATE
Field Sampling	DATE
Sample Analysis	Within **7 days** after sampling completion.
Data Verification	Within **15 days** after analysis.
Draft Report	Within **10 days** after data verification.
Final Report	Within **7 days** of draft report.

A8. SPECIAL TRAINING/CERTIFICATION

The U.S. EPA Sampling Team members and the CRL analytical staff possess the required training and qualifications to perform their functions for this project. No special training is anticipated for this project.

A9. DOCUMENTS AND RECORDS

The Quality Management Plan (QMP), Land and Chemicals Division, Region 5, May 2008, was used for preparation of this QAPP. Other documents that will be produced as a result of this project include a field notebook, an analytical report generated by CRL, and a Final Report generated by the Project Manager.

GROUP B. DATA GENERATION AND ACQUISITION ELEMENTS

B1. SAMPLING PROCESS DESIGN (EXPERIMENTAL DESIGN)

Complete sampling procedures may be found in the companion sampling plan. *See the site-specific SAP for this project (Appendix A).*

B2. SAMPLING METHODS

See the SAP for this project. Appendix A.

B3. SAMPLE HANDLING AND CUSTODY

B3.1 Field Custody Procedures

The environmental samples will be maintained under custody at all times from collection until delivery to CRL. The CRL will maintain the samples under custody through analyses. The custody procedures to be followed mimic the EPA Samplers Guide to the CLP program EPA/540/R-96/032). CRL is the evidence file custodian. Complete field custody procedures to be used are also found in the SAP for this project.

B3.2 Laboratory Custody Procedures

CRL custody procedures for sample receiving and log-in, sample storage and numbering, tracking during sample preparation and analysis, and storage of data are described in the CRL QMP.

B3.3 Final Evidence File Procedures

All hard copy analytical data and chain-of-custody records shall be retained by the CRL following the analyses, with one copy provided to the Project Manager. The CRL shall review the data and provide a verification report. The hard copy analytical data, custody records and verification report shall be maintained in the CRL's secure, limited-access data storage area. This portion of the evidence file shall be stored at the CRL for a period of three years after which the records shall be offered to the Project Manager prior to permanent transfer to the Federal Records Center in Chicago. Each laboratory shall maintain all raw analytical data on magnetic media whenever possible for a period specified in their laboratory QAPP.

The Project Manager or his designee shall maintain the portion of the final evidence file including: field logbooks, photographs, drawings, field QA/QC reports, data assessment report, and final project report.

B4. ANALYTICAL METHODS

B4.1 Field Analytical and Measurement Procedures

USGS SOP will be followed to determine the stability prior to sample collection.

B4.2 Laboratory Analytical and Measurement Procedures

CRL Standard Operating Procedures (SOPs) will be used for all analytical procedures on this project. Appendix B and C contain all the analytical methods used in this project.

- The methods included are: CRL equivalent of 8260B and all associated sample preparation procedures.

B5. QUALITY CONTROL

B5.1 Field Quality Control Checks

The primary quality control (QC) checks will be the collection of a sufficient amount of sample to assure adherence to the SAP. The sampling procedures consist only of collecting whole, intact lamps, and placing them in containers for safe transport to the laboratory. No special equipment will be used that could contaminate the lamps.

B5.2 Laboratory Quality Control Checks

These QC checks will primarily include initial and continuing calibrations, QC check samples, method blanks, and laboratory duplicates.

The QC limits are given in each method or procedure.

B5.3 Quality Assurance Objectives

B5.3.1 PRECISION

Precision is the degree to which data generated from replicate or repetitive measurements differ. Precision may be stated in terms of standard deviation, range, relative percent difference and relative range.

B5.3.1.1 Field Precision

B5.3.1.2 Laboratory Precision

Use CRL's standard Methodology for analysis of VOCs (8260 B equivalent) Laboratory precision is determined using laboratory analytical duplicates. Precision is measured by the relative percentage difference in concentration between two samples. The precision objective for this event is for duplicates to match within 20% relative difference.

B5.3.2 ACCURACY

Accuracy is defined as the difference between a reported value and a known or accepted value.

B5.3.2.1 Field Accuracy

One Matrix spike duplicate MS/MSD collected per 20 samples.

B5.3.2.2 Laboratory Accuracy

Laboratory accuracy may be assessed through the use of spiked samples, check standards, and initial/continuing calibrations. If a matrix spike and matrix spike duplicate cannot be prepared to determine accuracy then the laboratory must use a laboratory blank and provide an explanation.

B5.3.3 COMPLETENESS

Completeness is defined as the measure of the percentage of the amount valid, acceptable data generated, relative to the amount of data that was expected to be collected. For this project, completeness objective is 100%.

B5.3.4 REPRESENTATIVENESS

B5.3.5 COMPARABILITY

All data collected during this project is intended to be comparable for all sampling locations by consistently using step wise sampling and analytical procedures.

B6. INSTRUMENT/EQUIPMENT TESTING, INSPECTION, AND MAINTENANCE

B6.1 Field Instrument and Preventative Maintenance

USGS protocol shall be followed.

B6.2 Laboratory Instrument and Preventative Maintenance

The Laboratory shall follow standard, established procedures. Any deviation should be cleared through the EPA quality assurance coordinator prior to analysis.

B7. INSTRUMENT/EQUIPMENT CALIBRATION AND FREQUENCY

B7.1 Field Instrument Calibration

USGS protocol shall be followed

B7.2 Laboratory Instrument Calibration

Calibration procedures for laboratory instruments will consist of initial calibration, calibration verification and continuing calibration verification. For a description of the calibration procedures for a specific laboratory instrument, refer to the procedures and methods provided by CRL for running the required analyses.

CRL will maintain a sample logbook for each instrument which will contain at least, but not limited to the following information: instrument identification, serial number, date of calibration, analyst, calibration solutions run and the samples associated with these calibrations.

B8. INSPECTION/ACCEPTANCE OF SUPPLIES AND CONSUMABLES

B9. NON-DIRECT MEASUREMENTS

~~Generally Not applicable, although~~ USGS protocols and CRL protocols shall be followed.

B10. DATA MANAGEMENT

No separate quality assurance reports to management are expected for this project. The final project report shall include a quality assurance section that shall summarize the verification of field and laboratory data, any field or lab QA problems, field and lab audit results and proposed and/or implemented field corrective actions.

The CRL QA coordinator will ensure that a complete data package is delivered to the EPA Project Manager for verification in the agreed turn around time for CRL.

See Group B, Section B3, B3.3, Final Evidence File Procedures for data management procedures.

GROUP C. ASSESSMENT AND OVERSIGHT ELEMENTS

C1. ASSESSMENTS AND RESPONSE ACTIONS

The Project QA Coordinator has the responsibility for conducting Performance and System Audits, as needed.

C1.1 Field Performance and Systems Audits

U.S. EPA Field Audits will not be required for this project, since U.S. EPA staff will be involved in conducting the field sampling.

C1.2 Laboratory Performance and Systems Audits

No project-specific laboratory audits by the U.S. EPA of the CRL are expected prior to the initiation of sampling. CRL has undergone several quality systems audits prior to this project.

C1.3 Assessing Data Precision, Accuracy and Completeness

C1.3.1 PRECISION ASSESSMENT

Precision shall be assessed using relative percent difference (RPD) calculated as:

$$RPD = \frac{D1 - D2}{(D1 + D2)/2} \times 100\%$$ where, D1= investigative sample result
D2= duplicate sample result

C1.3.2 ACCURACY ASSESSMENT

Accuracy may be assessed using % recovery of spiked or surrogate standard sample results calculated as:

$$\% \text{ Recovery} = \frac{(SSR - SR)}{SA} \times 100\%$$

where, SSR = Spiked or surrogate sample result
SR = Unspiked sample result
SA = Amount of spike or surrogate added

C1.3.3 COMPLETENESS ASSESSMENT

Completeness is defined as the percentage of the amount of valid data obtained relative to the amount of data which was expected to be collected.

$$\text{Completeness} = \frac{\text{Amount of valid data obtained}}{\text{Amount of data expected to be collected.}} \times 100\%$$

C1.4 CORRECTIVE ACTION

The need for corrective action during the project may be determined at several points: during field activities, during lab activities and during data validation & assessment. All corrective action procedures will be reviewed with the assigned EPA QA Contact and documented in the final report.

C1.4.1 Field Corrective Action

Corrective action in the field may be necessary due to quality assurance problems during sampling that were not anticipated in this QAPP. In general, the need for corrective action will be identified by the field team leader. Corrective action should be approved by the assigned EPA QA Contact prior to initiation. The field team leader may consult other technical staff (i.e. CRL, risk assessors, senior geologists, etc.) regarding potential corrective actions where data quality is an issue.

C2. Reports to Management

The final project report shall include a QA section that shall summarize the verification of field and laboratory data, any field or laboratory QA problems, field and laboratory audit results and proposed and/or implemented field corrective actions. The report will also discuss the field

activities and analytical results. Details on the reporting requirements for this project can be found in the SAP (Appendix A).

GROUP D. DATA VALIDATION AND USABILITY ELEMENTS

D1. DATA REVIEW, VERIFICATION, AND VALIDATION

The EPA Project Manager will record all qualitative descriptions, diagrams of the sample area, sample locations, and the name of the EPA Field Team Member collecting each sample in a log book. A photo log of the sampling event will also be produced.

D2. VERIFICATION AND VALIDATION METHODS

D2.1 Laboratory Data Reduction

CRL data reduction procedures for the analyses are specified in each section of the CRL's SOPs.

D2.2 Laboratory Data Verification

CRL data verification procedures for the analyses are specified in each section of the CRL's SOPs.

D2.3 Laboratory Data Validation

The Project manager will rely on the information contained in the data package and laboratory report, as provided by the CRL, for validation of the data generated in this project.

D2.4 Laboratory Data Reporting

The CRL shall follow standard, established procedures. Any deviation from the procedures should be cleared through the U.S. EPA QA contact before execution.

D3. RECONCILIATION WITH USER REQUIREMENTS

D3.1 Laboratory Corrective Action

All laboratories will follow standard, established procedures. Any deviation from standard procedures should be cleared through the U.S. EPA QA contact before execution.

D3.2 Corrective Action During Data Verification and Data Assessment

The need for corrective action may be identified during the data verification process conducted by the CRL. If the corrective action requires re-analyzing the sample, the laboratory QA coordinators in conjunction with analysts shall determine whether the samples are within holding time and whether sufficient sample remains for re-analysis.

If data are determined to be unusable, results are estimated quantitatively or the samples cannot be re-analyzed, the EPA QA Contact and the field team leader will be advised of the situation by the CRL. The U.S. EPA Project Manager can then determine the feasibility of re-sampling or accepting the limitations of the data.